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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,866	10/23/2003	Paul A. Ward	082278-0235	6735

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EXAMINER	
CORRIELUS, JEAN B	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/691,866	WARD ET AL.	
	Examiner	Art Unit	
	Jean B. Corrielus	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 7/8/09.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-26,36,41 and 42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-26, 36, 41, and 42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 24-26, 36 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kendig et al US Patent No. 4,955,269 in view of applicant's admitted prior art page 12, lines 9-17.

As per claim 24, Kendig teaches a method and apparatus Fig. 2 comprising a vibration sensor 23 which produces a sinusoidal signal see for instance fig. 6 in response to measurement of a parameter (i.e. vibration); an analog to digital converter 26 which receives said analog signal and converts the analog signal to a digital signal to form a digitized signal v(t) considered as the claimed "inphase digital signal" a Hilbert transformer approximation device see circuit 28/44 and col. 5, lines 1-3 which receives said digital signal output of digitizer 26 and produces signal "H(v(t))" (quadrature component of said digital signal) (note that it is an inherent nature of the transformer to introduce a phase shift to said digital signal) an amplitude computation device 28 (note the device 28 inherently includes an amplitude computation device in order to determine the amplitude of the sinusoidal signal) which receives said "digitized signal v(t)" (inphase component and ""H(v(t))" (quadrature component of said digital signal)" and computes the instantaneous amplitude of said digital signal according to a= SQRT(v(t)^2

+ $H(v(t))^2$) see col. 5, equation 4. Kendig et al further teaches the additional component of a phase computation device inherently included in device 28 which receives said "digitized signal v(t)" (inphase component and "H(v(t))" (quadrature component of said digital signal)" and computes the instantaneous amplitude of said digital signal and computes the instantaneous phase of said digital signal according to θ=ARCTAN $(H(v(t)/v(t))^{-1}$ note col. 5, equation 6. As Shown in fig 5 the amplitude A(t) is outputted. Note at col. 5, Kendig clearly teaches that the phase of the signal computed using equation 5 is used in equation 6 to compute the frequency. One skill in the art would have recognized that a phase computation device or module or block and a frequency computation device or module or block would have been required in Kendig firstly to implement equation 6 to compute and output the phase, and secondly to output the computed phase to the frequency device to compute the frequency to implement equation 5. Hence, the computed phase has to be outputted by the phase computation device or module or block to the frequency computation device or module or block in order to compute the frequency. However, Kendig fails to a CORDIC processor is used to compute the phase and amplitude signal. However, at page 12, lines 9-17, applicant acknowledges that a CORDIC processor is a well known device used in signal processing for fast digital trigonometric computations. Given that it would have been obvious to one skill in the art to incorporate such a teaching in Kendig in order to perform fast digital trigonometric computations.

As per claim 25, note that the delay in Kendig is inherent because , as established in the art of digital signal processing, it is an inherent nature of the Hilbert

transformer to introduce a predetermined delay into said “H(v(t))” (quadrature) component of the digitized signal.

As per claim 26, note that because of the inherent delay introduced by the Hilbert transformer, Kendig has to include a delay device to introduce said predetermined delay into the digitized signal i.e. (Inphase component) so that the digitized signal and the Hilbert transformed signal can be provided to the phase and amplitude computing device at the same time to determine the phase and the amplitude of the sinusoidal signal.

As per claim 41, see claim 24. In addition, note that the analog signal generated by Kendig includes both a phase and an amplitude of said parameter(vibration) see fig. 6.

3. Claims 36 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kendig et al US Patent No. 4,955,269 in view of applicant’s admitted prior art page 12, lines 9-17 and further in view of Kotoulas US Patent No. 6,751,602.

As per claim 36, Kendig teaches a method and apparatus Fig. 2 comprising a vibration sensor 23 which produces a sinusoidal signal see for instance fig. 6 in response to measurement of a parameter (i.e. vibration); an analog to digital converter 26 which receives said analog signal and converts the analog signal to a digital signal to form a digitized signal v(t) considered as the claimed “inphase digital signal” a Hilbert transformer approximation device see circuit 28/44 and col. 5, lines 1-3 which receives said digital signal output of digitizer 26 and produces signal “H(v(t))” (quadrature component of said digital signal) (note that it is an inherent nature of the transformer to

introduce a phase shift to said digital signal) an amplitude computation device 28 (note the device 28 inherently includes an amplitude computation device in order to determine the amplitude of the sinusoidal signal) which receives said “digitized signal v(t)” (inphase component and ““H(v(t))” (quadrature component of said digital signal)” and computes the instantaneous amplitude of said digital signal according to a= $SQRT(v(t)^2 + H(v(t))^2)$ see col. 5, equation 4. Kendig et al further teaches the additional component of a phase computation device inherently included in device 28 which receives said “digitized signal v(t)” (inphase component and “H(v(t))” (quadrature component of said digital signal)” and computes the instantaneous amplitude of said digital signal and computes the instantaneous phase of said digital signal according to θ=ARCTAN $(H(v(t)/v(t))^{-1}$ note col. 5, equation 6. Note that because of the inherent delay introduced by the Hilbert transformer, Kendig has to include a delay device to introduce said predetermined delay into the digitized signal i.e. (Inphase component) so that the digitized signal and the Hilbert transformed signal can be provided to the phase and amplitude computing device at the same time to determine the phase and the amplitude of the sinusoidal signal. As Shown in fig 5 the amplitude A(t) is outputted. Note at col. 5, Kendig clearly teaches that the phase of the signal computed using equation 5 is used in equation 6 to compute the frequency. One skill in the art would have recognized that a phase computation device or module or block and a frequency computation device or module or block would have been required in Kendig firstly to implement equation 6 to compute and output the phase information, and secondly to output the computed phase information to the frequency computation device/circuit of block to

compute the frequency to implement equation 5. Hence, the computed phase information has to be outputted to the phase computation device or module or block to the frequency computation device or module or block in order to compute the frequency. However, Kendig fails to a CORDIC processor is used to compute the phase and amplitude signal it also fails to teach the filtering of the digitized signal to attenuate out of band noise in said digital sinusoidal signal. However, at page 12, lines 9-17, applicant acknowledges that a CORDIC processor is a well known device used in signal processing for fast digital trigonometric computations. Given that it would have been obvious to one skill in the art to incorporate such a teaching in Kendig in order to perform fast digital trigonometric computations. In addition, Kotoulas teaches a filter 232 to attenuate out of band noise in said digital signal. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Kendig and applicant's admitted prior art in order to improve signal detection since the noise reduced signal would have produced a better signal.

As per claim 42, see claim 36. In addition, note that the analog signal generated by Kendig includes both a phase and an amplitude of said parameter(vibration) see fig. 6.

Response to Arguments

4. Applicant's arguments filed 7/8/09 have been fully considered but they are not persuasive. It is asserted that Kendig does not teach and output the phase of the signal in that at col. 5, lines 6-30 merely teaches the mathematical relation ship between instantaneous phase and instantaneous frequency of a signal. Examiner disagrees.

Clearly at col. 5, equation 4 the amplitude of the vibration signal is computed, and equation 6 the amplitude of the same signal is computed as well. The phase computation result is outputted to equation 5 (i.e. to a computing block implementing equation 6). In addition, as noted above, one skill in the art would have recognized that a phase computation device or module or block and a frequency computation device or module or block would have been required to compute, respectively, first the phase of the signal then its frequency to implement equations 5 and 6, at col. 5. Applicant further argues that additional processing could disadvantageously complicate the Kendig device. Contrary to the applicant's position, there would not be any need to add additional processing in Kendig rather the processing circuitry, module or block , such as, the phase computing device or module or block and the frequency computing device or module or block are necessary in Kendig in order to implement equations 5 and 6.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B. Corrielus whose telephone number is 571-272-3020. The examiner can normally be reached on Monday-Thursday from 9:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jean B Corrielus/
Primary Examiner, Art Unit 2611